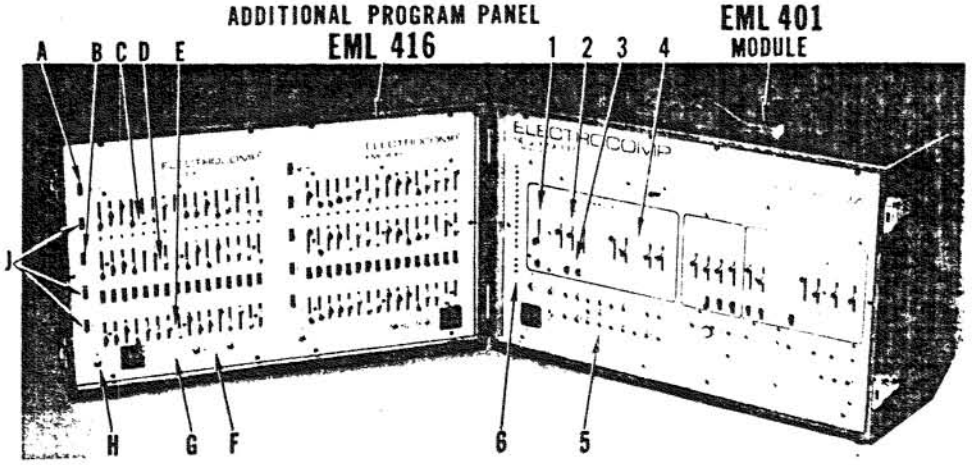


2. QUANTIZER. The QUANTIZER converts the infinitely variable voltage from the second control voltage row, PITCH row, into discrete steps, enabling the pitches of a sequence to be set quickly and accurately, digitally. The QUANTIZER can be scaled from 12 tones/octave, the diatonic scale, to 60 tones/octave. The Quantized voltage is then applied to a column of Light Emitting Diodes (LED's) and to the oscillators and filter.* An LED corresponds to each pitch and octave, the result is "instant feedback". The pitch for any stage may be changed at any time without disrupting the other digitized pitches of the sequence.

3. TRIGGER. The TRIGGER section performs a multitude of functions. The TRIGGER OUT jack provides a pulse which may be used to "trigger" numerous functions. The TRIGGER IN jack permits external trigger/pulse sources to advance the sequence or "trigger" the envelope of the EML 401 module.* The INT/EXT switch selects whether the internal or an external trigger/pulse will advance the sequence and trigger the 401 envelope.* The FAST/SLOW switch is a trigger input filter switch.

4. OSCILLATOR AND FILTER CONTROL MIXERS. The CONTROL MIXERS are used to apply vibrato, pitch sweep, and transposition voltages to the audio oscillators; and various control voltages to the filter for further timbre modification of the sound.

   The MIXERS input jacks and sliders are employed to introduce and apply external control voltages to the oscillators and/or filter.

5. PATCH PANEL. The EML 400 Sequencer's PATCH PANEL provides inputs and outputs for all Sequencer functions which enables you to:

   a. Change parameters of the sound at individual stages.
   b. Control other ElectroComp keyboard and studio synthesizers.
   c. Advance and control the sequence from external sources.
   d. Expand the Sequencer into a larger system.

   The PATCH PANEL permits the EML 400 Series Sequencer to be expanded with other fine ElectroComp Synthesizers. The input and output jacks insure complete compatibility.

6. LIGHT EMITTING DIODE (LED) COLUMN

*Sequential Systems ordered with EML 401 Modules.

EML 416 PROGRAM PANEL

The EML 416 is an additional 16 stage by 3 control voltages PROGRAM PANEL. Adding the EML 416 onto an EML 400 Sequencer exponentially increases the power hence the capabilities of the resulting EML 400/416 Sequencer System. The EML 400/416 provides the means to realize 32 stage sequences, permutations, retrogrades, permutated retrogrades, iso-rhythmic lines, and much more. The sound possibilities are infinite.

A Sequencer may be configured to any size with additional 416s. The EML 416 is $400.

EML 401 MODULE

The addition of an EML 401 Module to the EML 400 Sequencer forms a complete and independent Sequential Synthesizer. The 401 permits the Sequencer system to be operated without tying up other synthesizer equipment you may own. The EML 401 Module contains two wide-range audio Voltage Controlled Oscillators with selectable waveforms and switch-variable "phase lock". Oscillator 2 may be tuned to any interval with respect to Oscillator 1 spanning more than an octave. An external audio source of reasonable amplitude may be patched into the 401 for (additional) modification.

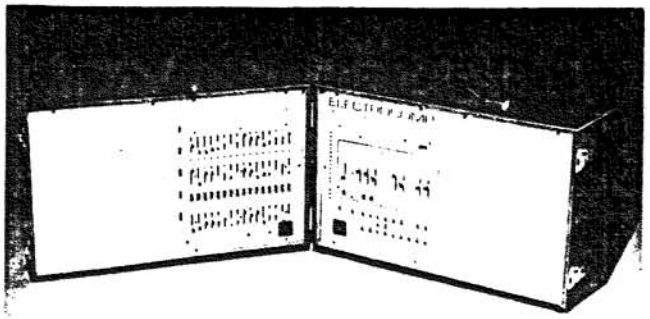
The famous EML Voltage Controlled Multimode Filter (high, band, and low pass) is the principle timbre modifier of the 401. The multimode filter has variable controls for tuning, emphasis, and filter tracking for complete control over the timbre of the sound.

A variable Amp/Ring Modulator is contained in the 401 to generate strums and tremolos, dynamic changes within a sequence, and eerie ring modulated sounds.

The newest feature of the EML 401 is the Voltage Controlled Envelope. The voltage control envelope is a tremendous asset for the electronic musician. Simply, the voltage control envelope "reads" time or a control voltage. Long notes result in long envelopes, short notes – short envelopes. The Decay or both Attack and Decay may be voltage controlled from either the DURATION row or an external voltage. The EML 401 also contains a Voltage Controlled Amplifier.

Sequencer independence provided by the 401 is a very valuable feature. Compounding this asset is the ability of the EML 401 to be independent of the Sequencer and controlled from an ElectroComp keyboard synthesizer. The EML 401 increases the capabilities of the keyboard unit with additional oscillators, another voltage controlled multimode filter, a voltage controlled envelope, modulator, and voltage controlled amplifier. Almost another synthesizer for $350 when ordered with the EML 400 Sequencer. The EML 401 is available as a separate unit complete with power supply and hardwood walnut stained case for $450.

ADDITIONAL
ELECTROCOMP SEQUENTIAL SYNTHESIZER SYSTEMS



EML 400 SEQUENCER

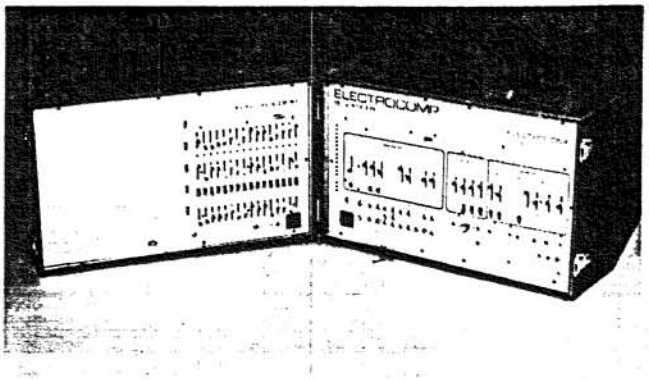
$950.00

The EML 400 is 16 stages long with three independent control voltages per stage. It contains a voltage controlled clock, a Quantizer, controller mixers, a complete patch panel, a gated pulse, and auto-set.

EML400/401 SEQUENCER

$1300.00

The EML 400/401 Sequencer is an EML 400 Sequencer augmented with an EML 401 Module.



BUYING A SYNTHESIZER. EML Synthesizers are regionally available from local representatives or directly from the factory. To order direct, send a letter and a certified check for 50% of the purchase price to:

ELECTRONIC MUSIC LABORATORIES, INC.
P.O. BOX "H"
VERNON, CONNECTICUT 06066
Tel: (203) 875-0751

The remaining 50% will be due on delivery.

Purchases by rated institutions (schools, universities) are payable 30 days from the date of invoice.

Synthesizers/Sequencers are shipped by United Parcel Service fully insured.

electronic music laboratories, inc.

P.O. Box H, Vernon, Connecticut 06066 Tel: (203) 875-0751

ELECTROCOMP 400

AN INTRODUCTION TO THE EML 400 SERIES SEQUENCER

A Sequencer is a "memory" device. Ours can "memorize" a variety of descriptive parameters of a musical sequence. The commonly memorized – preset – parameters are: the pitches of the sequence, the durations of the pitches and the tempo. After the parameters are "programmed", the Sequencer can play back the sequence as many times as desired. Other parameters may be programmed in place of, or in addition to, the three listed assuring immense flexibility.

The EML 400 Series Sequencer introduces several new concepts to Sequencers, such as the ability to "Quantize" or digitally set pitch. On our Sequencer there is a light assigned to each pitch and octave. To set the pitch of a particular stage in a sequence you simply move the stage's pitch slider until the desired pitch's light comes on. The pitch is "memorized" until you "program" a new pitch.

A second major innovation is a voltage controlled envelope generator, which allows the attack and/or decay of each note of a sequence to vary independently! This provides a level of nuance previously unattainable. Compounding these two innovations, the EML 400 Series Sequencer 32 stage configuration, can realize permutations, retrogrades, permutated retrogrades, multiple envelopes within a note, iso-rhythms versus poly-pitched lines and much, much more.

And to top that, the EML 400 Sequencer has enormous performance abilities.

PROGRAM PANEL

A. ADVANCE SWITCH. The ADVANCE SWITCH determines whether the Sequencer will advance automatically, manually, or with the initiation of a proper trigger/pulse.

B. SET/OFF/RESET SWITCH. The SET/OFF/RESET SWITCH has three modes of operation: "set" and hold the sequence at Stage #1; permit the sequence to advance; or inactivate the sequence.

C. VOLTAGE ROW (DURATION). The DURATION row sets the rhythm of the sequence. The row's individual sliders determines the length of time the stages are "on" — a slide sets the rhythmic value of the stage. The stages' durations are variable from SKIP (0) through HOLD (∞). Associated with each stage is an LED, which lights when the stage is "on".

The voltages from any row of sliders may be routed, via its Voltage Routing Switch, for application to control other voltage controllable functions.

D. VOLTAGE ROW (PITCH). This row of control sliders and switches is used to program the pitches of the sequence. The sliders set the pitch of the stage, the switches set the octave. Selecting QUAN, with the row's Voltage Routing Switch, directs the sliders' voltages to the QUANTIZER circuit in the CONTROLLER PANEL. The QUANTIZER converts the infinitely variable voltage along the slider into 14 discrete pitch steps. The switches have a three octave range. The discrete steps are indicated by a column of Light Emitting Diodes (LED's) which work in conjunction with the QUANTIZER and the slide and switch of the "on" stage. The position of the slide and switch will cause certain LED's to light indicating the exact pitch and octave of the "on" stage. Positioning a slide to the top of its travel (step #14) programs a REST. No pitch is programmed, thus no pitch sounds. The QUANTIZER can be scaled from 12 tones/octave through a variety of microtonal scales up to 60 tones/scale.

E. VOLTAGE ROW (EFFECTS). The sequence of voltages from the EFFECTS row may be assigned to do a variety of functions. The voltages may control another pitch source, change the timbre, envelope, dynamics of each stage, or regulate any voltage controllable function.

F. 16 STAGES IN-OUT. These jacks are employed to "loop" the sequence. If one PROGRAM PANEL is used, a patch cord between the two will cause the 16th stage to "trigger" the first. The result is the sequence will repeat. No patch cord — no repeat. With additional PROGRAM PANELS these jacks permit expansion of the Sequencer by factors of 16 x 3.

G. AUTO-SET. AUTO-SET is a new Sequencer feature which makes Sequencers extremely functional and exciting in live performance. AUTO-SET provides the ability to re-start the sequence from any stage of the programmed sequence at any time, with any appropriate voltage.

AUTO SET: A sequence may repeat for x number of times, be stopped from any stage in the sequence, reset to Stage #1 and held indefinitely. The sequence can be "re-started" by the musician or automatically, depending on the AUTO-SET control voltage. AUTO-SET can be activated from keyboard voltages, envelopes, samplers, sub-audio oscillators, and PROGRAM PANEL voltages. Beyond its performance applications, AUTO-SET provides the resources for realizing many compositional devices (i.e. iso-rhythms versus poly-pitched lines) with the addition of a second PROGRAM PANEL (EML 416).

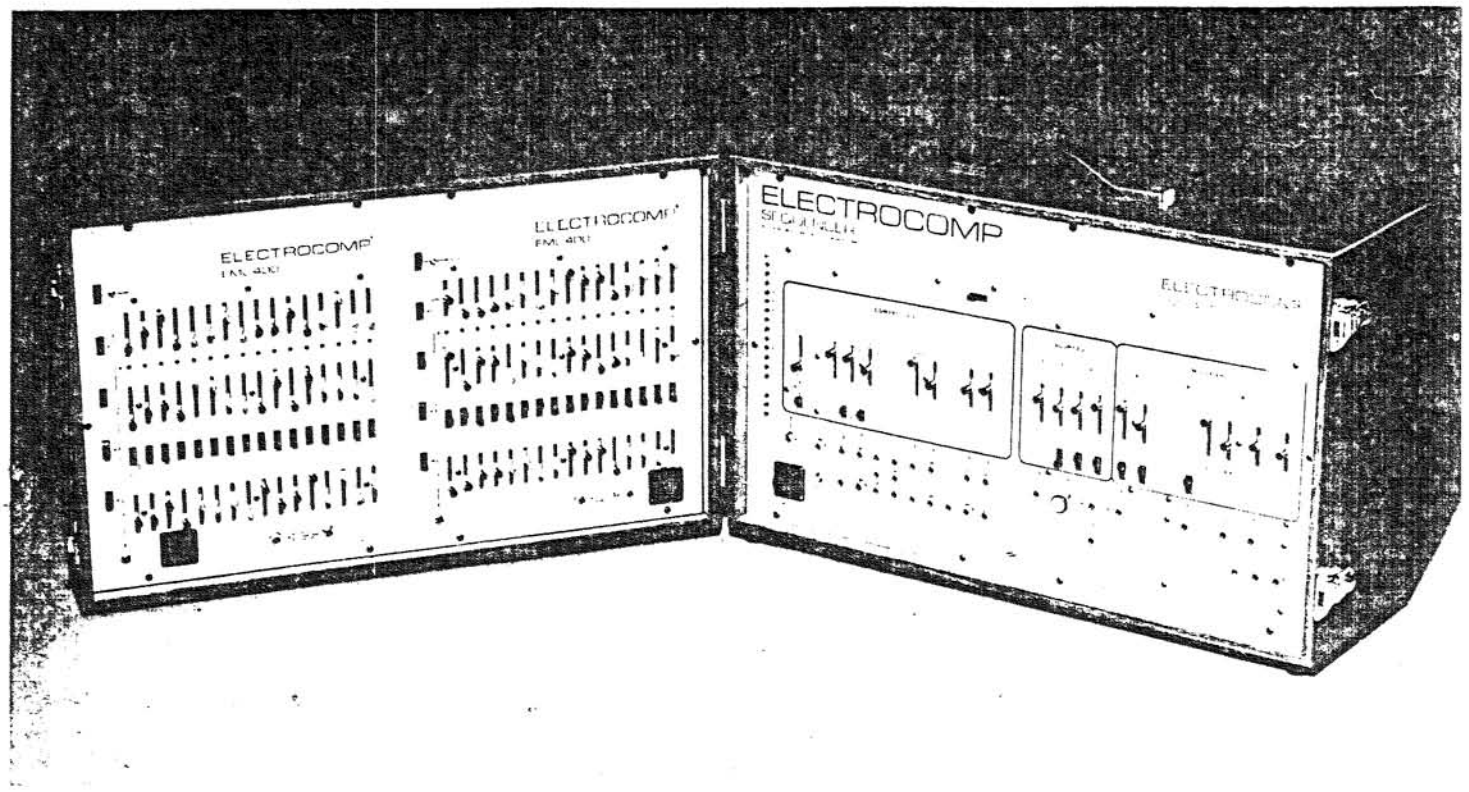
H. GATED PULSE OUT. A pulse is available at the GATED PULSE jack whenever a slider of the EFFECTS row is raised. This pulse may be employed to selectively trigger diverse functions (i.e. envelopes, sampler, auto-set) at designated stages.

J. VOLTAGE ROUTING SWITCHES. A VOLTAGE ROUTING SWITCH is associated with each row of control voltage sliders. They are employed to direct the row's voltages for internal or external applications.

CONTROLLER AND PATCH PANEL

1. CLOCK. The EML 400 Sequencer contains a voltage controlled CLOCK. The CLOCK sets the tempo of the sequence. The CLOCK's slider and external voltages may be utilized to further control the sequence's tempo.

MEET THE NEW MEMBER OF YOUR GROUP



We've done it again. We designed a Sequential Synthesizer that has musical abilities you could only have dreamed of before today. The EML 400 Series Sequencer combines many new revolutionary synthesizer functions with the best analog and digital electronic techniques. The result — the most expressive studio/performance Sequencer ever developed. Our EML 400 Sequencer opens new musical worlds and new dimensions for your music. Our 400 is ready to do more for you in the studio or on the concert stage.

New developments in technology, EML innovations, and new sequential functions all contribute to make the EML 400 Sequencer the most flexible and effective performance Sequencer. Because the 400 is completely programmable, it has tremendous abilities and potential in performance situations. It allows musicians to realize "live" what was previously limited to large electronic studios.

The EML 400 Sequencer can complement or cornerstone your rhythm section by "programming" it for ostinato bass passages or percussion lines. This gives you and your rhythm section more and greater freedom for musical expression and nuance, plus the ability to explore poly-rhythms!

Melody and/or harmony lines may be "programmed" on the 400, adding new instrumental facets to explore. Depending on the configuration of the 400 Sequencer, bass passages, melodic and harmony lines may be 16 events long, or 32 events long, or 48, or 64 . . . . . there's no limit. Its expandable! For added performance and studio flexibility, a number of **different** sequences may be programmed and used at various times. A programmed sequence can be directed to playback continually, once, or as many or as few times as you decide. It can be directed to "step" one stage only, whenever you depress a key; so the 400 will play along with you! Or you can play along with the Sequencer, and with a flick of a switch have the programmed sequence play backward — retrograde!

We didn't stop there. The EML 400 Series Sequencer can control or be controlled from other fine Electro-Comp keyboard or studio synthesizers creating an extremely powerful **studio** or **performance** synthesizer system.

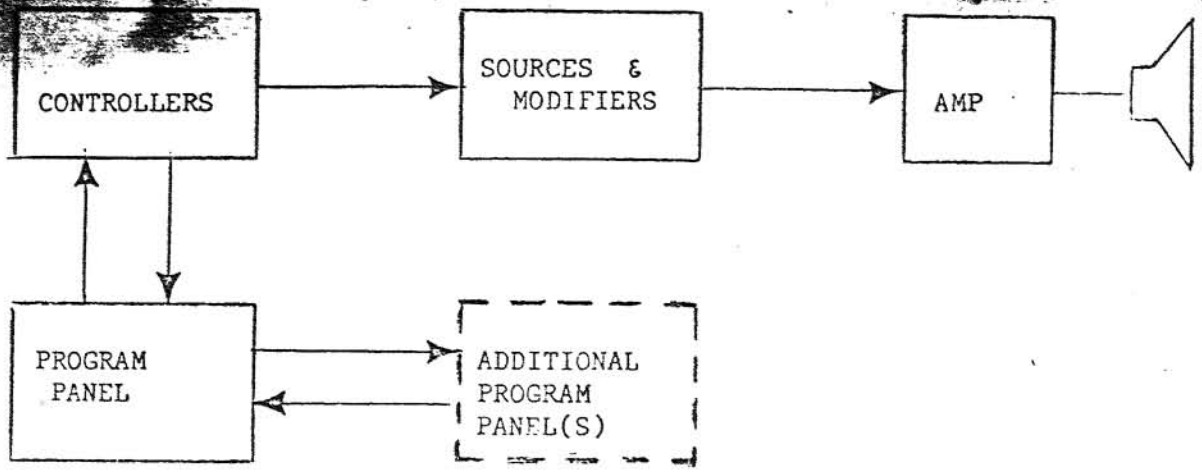
The abilities, innovations, and versatility of the 400 are revolutionary, but the prices are even more impressive.

Take some time and read about our Sequencer and our other Synthesizers, you'll see that Electronic Music Labs gives you immense capabilities in quality instruments at realistic prices.

EML 400 SERIES SEQUENCER

EML 400 SERIES SEQUENTIAL SYNTHESIZER MANUAL

The EML 400 Series Sequential Synthesizer is available in several configurations to permit each user a maximum of flexibility. A basic sequencer consists of the following:



The PROGRAM PANEL is used to set up a series or sequence of events. During each event period, the PROGRAM PANEL generates 3 independently adjustable voltages. These voltages may be used to:

a. control a Voltage Controlled Clock which determines the time advance to the next event.

b. control the pitch of a Voltage Control Oscillator.

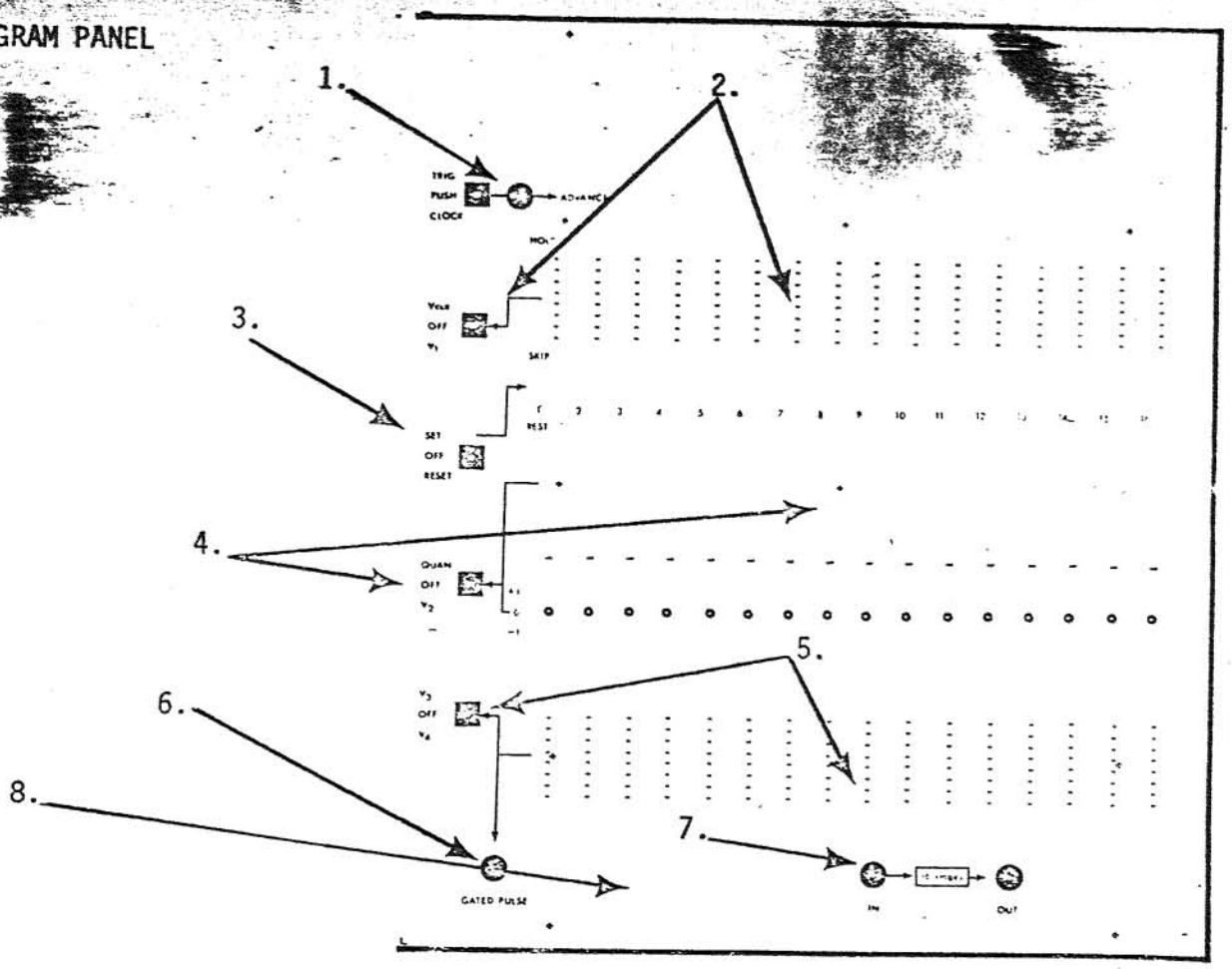
c. control the timbre, loudness, a second pitch, etc. of the note by applying the voltage to the Voltage Control Filter, Voltage Control Amplifier, another Voltage Control Oscillator(s), etc.

The CONTROLLER PANEL contains the overall rate control, tuning controls, triggering circuits, and controls for implementing pitch and timbre variations.

The SOURCE PANEL contains the oscillators, filter, envelope generator, amplitude shaper and their associated controls. This panel is designated the 401 module. Either the EML 100, EML 101 or EML 500 may be substituted for the 401 module. (Early serial numbered instruments may require a minor modification - consult factory.) The sequencer will also run the EML 200 but the Voltage Controlled Filter function is not available.

GENERAL MODULE DESCRIPTION:

I. PROGRAM PANEL



1. ADVANCE SLIDE SWITCH

   This slide switch determines how the sequence advances from stage to stage.

   A. TRIGGER: sequence will advance from trigger pulse corresponding to the output of the trigger function on controller panel.

   B. PUSH: sequence will advance when pushbutton is depressed.

   C. CLOCK: sequence will advance under control of the clock.

2. This row of slide controls will generate a series of voltages as the sequence advances from stage to stage. If the associated slide switch is in the CLOCK position, the slide controls will determine the rate of the clock pulses and hence the advance of the sequence to the next event. If the slider is at top of its travel - HOLD - its sequence will not advance. As the control is moved toward SKIP, that event will last for a shorter period. Finally, when the slide control is near the end of its travel near SKIP the event will occur so rapidly that it is not detectable and that stage will effectively be skipped.

If the Advance Slide Switch is in the OFF position, the Voltage will not be used. If the slide switch is in V1, the Voltage is available at the V1 jack on the CONTROLLER PANEL for use as desired.

3. SET/OFF/RESET SLIDE SWITCH

In SET, the sequence is "set" to stage 1 and will remain there. In RESET, all stages will be inactivated and remain so. OFF - this position permits advance of the sequence.

4. This row of slide controls generates a series of voltages as the sequence advances. If the associated slide switch is in the QUAN position, the voltage determined by the slide controls and their associated Octave switches will be routed to the Quantizer within the CONTROLLER PANEL and hence to the Voltage Controlled Oscillators and Filter. It is this Quantizer Circuit which converts the infinitely variable Voltage from the slide controls into discrete stepped voltages corresponding to the pitches of the scale. In the OFF position the voltage is not used.

In V2 position, the control slider voltage is routed to the V2 jack on the CONTROLLER PANEL. The Octave Slide Switch associated with each of the independent stages will then have no function.

5. The slide controls in this row generate a series of voltages as the sequence advances. The slide switch determines whether the voltage is directed to V3 or V4 jacks on the CONTROLLER PANEL or not used. The voltage may be patched from V3 or V4 to the filter control input to vary the timbre of the pitch for each stage, or a number of other places to control a different parameter.

6. GATED PULSE

A pulse occurs at this jack whenever the sequence advances to a stage where a slide control in the Control Voltage row marked 5 in the picture, is more than 20% up from its bottom position. The GATED PULSE may be used for selectively triggering other functions on the 100, 101 and 200 as well as controlling the advance of a sequence on an additional PROGRAM PANEL.

1. CLOCK

The CLOCK slide control effects the tempo of the sequence. The Vclk/OFF switch determines whether the CLOCK rate is controlled by the Vclk voltage from a PROGRAM PANEL. In OFF, the sequence will advance at a constant tempo controlled only by the Clock's Slide Control, it ignores the voltage set by the first row sliders. An external control voltage from an appropriate source may be patched into Vext to further control the tempo of a sequence.

2. QUANTIZER

The TUNE control is used to transpose the pitch produced by the QUANTIZER output voltage. The COARSE and FINE controls are used to adjust the tuning interval.

3. The QUANTIZER voltage is applied to the Light Emitting Diodes. The lights, numbered 1-13 (vertical column of lights, left of the CONTROLLER PANEL) correspond to an octave and one note on the 12 tone scale. The TUNE control may be used to transpose pitch so that the #1 light corresponds to a particular pitch, such as a C. If the interval controls are adjusted for the 12 tone scale, light 2 will correspond to C#, light 3 to D, etc. Light 13 will be a C, up one octave from light 1. The green light indicates the active stage is in REST. No pitch has been set, nor will a pitch sound.

The -1, 0, +1 lights indicate the octave setting of the active sequencer stage.

In tuning the instrument to the proper interval, note that in the -1 octave, light 1 condition, the COARSE and FINE Quantizer controls have no effect. This provides a convenient reference point. It is necessary to set the instrument to this condition and adjust the pitch to a C or any other convenient pitch with the QUANTIZER TUNE control, then go to a +1 octave, light 13 condition and use the FINE control to adjust the pitch to precisely 3 octaves above the previous pitch. The COARSE control is used for generating microtonal scales. (See the section on Scaling and Fine Tuning the EML 400 Sequencer.)

4. TRIGGER

The TRIGGER section performs a variety of functions. It consists of two switches and two jacks. The TRIGGER OUT jack provides a pulse which may be used to trigger the EML 101, 200 or 500. The output of the INTERNAL/EXTERNAL slide switch is routed to the envelope of the 401 module. In INTERNAL position, a trigger pulse will be directed to the envelope at each clock advance except for rests and skips.

In the EXTERNAL position, pulses inputted at the TRIGGER IN jack will be directed to the envelope, and will cause the sequence to advance if the PROGRAM PANEL Advance Switch is in the TRIGGER position. The TRIGGER Input Switch will normally be in the FAST position unless a "noisy" source such as the EML 100/101 Gate Out signal is used to advance the sequence.

5. OSCILLATORS

This is an OSCILLATOR CONTROL MIXER used to provide vibrato and transposition voltages to the Oscillators. The two jacks labeled EXT are used to bring external control voltages to the Oscillators. The slide control labeled ENV normally has envelope voltage applied to it unless an external voltage is patched in at the EXT jack immediately below it.

6. FILTER

This is a FILTER CONTROL MIXER used to provide additional timbre control voltages to the Filter. The two jacks labeled EXT are used to bring external control voltages to the Filter. The slide control labeled ENV normally has envelope voltage applied to it unless another voltage is patched in at the EXT jack immediately below it.

7. OCTAVE SWITCH

The Octave Switch transposes the pitch set at the active stage by two octaves. Both Oscillators and the Filter are transposed.

8. EXPAND OUT CONNECTOR

The cable provided should be connected between this connector and one on the PROGRAM PANEL.

9. LINEAR QUANTIZE JACK

Provides pitch voltage output to the SEQUENCER INput on the EML 101 and 500. All EML 100's and early serial numbered EML 101's may require minor modification. See the back of the manual. On the EML 101's with serial numbers 646 or above, the CM3 jack has been modified to accept the SEQUENCER. INPUT.

10. EXPONENTIAL QUANTIZE JACK

Provides pitch voltage output to EML 200 Voltage Control Oscillators.

11. MULTIPLE

Two 3 jack multiples are provided.

12. V_{clk}

V1

V2 These Voltages appear at jacks for further use as determined by the positions of the various voltage routing switches on a PROGRAM PANEL.

V3

V4

EML 401 MODULE -
SOURCES AND MODIFIERS PANEL

SOURCES

The EXTERNAL VOLUME slide control and the associated external jack are used to bring external audio signals into the 401 panel.

The OSC 1 volume control determines the volume of the Oscillator 1 signal applied to the Filter. The switch below the slide control selects a Sawtooth or Square waveform or removes the Oscillator 1 signal from the Filter.

The OSC 2 volume control determines the volume of the Oscillator 2 signal applied to the Filter. The switch below the slide control selects a Sawtooth or Square waveform or removes the Oscillator 2 signal from the Filter.

OSC 2 TUNE. Oscillator 2 may be tuned to a unison with Oscillator 1 or to more than an octave above. The switch below the tune control determines the degree of PHASE LOCKING between OSC 1 and OSC 2. With the switch in PL2 there is a strong tendency for Oscillator 2 to "lock" at a pitch which is a whole numbered ratio to OSC 1 such as at a 3rd, 4th, or 5th. In PL1, the locking influence is diminished and "lock" may be accomplished at other musical intervals. In OFF, the locking effect is removed.

With the PHASE LOCK Switch in PL1 or PL2, the OSC 2 TUNE slide control will sound "scratchy" as the pitch will jump into "lock" as whole numbered ratios are approached. If a clicking sound is heard, the TUNE control should be adjusted slightly down. A little practice will pay dividends.

MODIFIERS

FILTER. The Filter TUNE controls the cut frequency of the Filter. (If you are unfamiliar with the Filter, consult the EML 101, or 500 manual.) The Switch labeled 0., .5, 1.0 indicates that degree to which the Filter "tracks" the Oscillators and hence the degree to which the timbre remains constant over the range of the instrument. In 1, the timbre will remain constant, in 0, the timbre may change dramatically becoming more mellow in the higher registers. The .5 position gives intermediate results.

The RESONANCE control is similar to that on the EML 100/101/500, the slide switch below selects LOW PASS, BAND PASS or HIGH PASS filters. Note that at High Resonance condition there is little difference between the three. At Low Resonance, the difference is dramatic and often delightful.

Vext

This input may be used to control the EML 401 module by the EML 100/101. A patchcord must be used from the MULT jack to the Vext at the end of the dashed arrow. The rotary TUNE pot is used to set the pitch of Oscillators 1 and 2. The EML 100/101 CM2 jack is patched to Vext. A patchcord from the EML 100/101 GATE output to the CONTROLLER PANEL TRIGGER Input will cause envelope initiation with the TRIGGER switches in SLOW and EXT. The Oscillators and Filter will not be controlled by the sequencer in this situation. (See the section titled "Interfacing the EML 401 Module with either the EML 101 or EML 500".)

ENVELOPE

The EML 401 contains an Envelope Generator in which the ATTACK and DECAY times may be Voltage Controlled.

When the selector switch below is in OFF position, the ATTACK and DECAY slide controls will function in normal fashion. When the selector switch is in mid position, the DECAY will be proportional to Vclk voltage - (Vclk comes from the top row of sliders on the PROGRAM PANEL, hence the DECAY time will be proportional to the length of notes in the sequence). In the uppermost position, both ATTACK and DECAY are Voltage Controlled. The associated jack may be used to substitute any desired external voltage for Vclk.

MODULATOR

The MODULATOR is a combined Ring/Amplitude Modulator. Oscillator 2 is the normal modulation source, but any signal may be substituted at the associated jack.

OUTPUT

The OUTPUT slide control determines the audio output level at the HI and LO jacks. Use the HI output jack for Hi-Fi and similar amplifiers. Use the LO output jack for guitar amplifiers and low level mixers. The PHONES output is unaffected by the output slide control.Use high impedance phones (600 ohms).

Now that we've gotten through the description of how things work, it's time to put it all together and make some music. This section assumes you have the 401 module. If not, turn to the last part of this section for instructions in using the 100/101/500 as signal sources and modifier.

1. Plug the EML 400 into the AC power source. If you don't have a 3 wire grounded socket, use a universally available adapter. Don't cut the 3rd prong of the power cord.

2. Connect cable provided between the connector on the CONTROLLER PANEL and any connector on a PROGRAM PANEL.

3. Turn the power on and adjust all controls as described and shown in the accompanying section(s).

SCALING AND FINE TUNING THE EML 400 SEQUENCER

The procedure for "tuning" the EML 400 Sequencer is divided into two major steps and their respective substeps.

The first major step shall be known as "Readying the Sequencer". That is to say, all of the functions that directly influence "tuning" are adjusted to facilitate the actual tuning procedure. All of the sequencer functions which do not bear directly on the tuning are turned off. The second major step is the "Scaling and Fine Tuning for the EML 400 Sequencer".

PART I READYING THE EML 400 SEQUENCER

A. CONTROLLERS

1. CLOCK

Switch to Vclk and move the clock's rate slider near the bottom of its travel.

2. TRIGGER

The trigger routing switch should be set to INT. (internal). Switch the trigger input to FAST.

3. QUANTIZER

Explained in Part 2.

4. OSCILLATOR & FILTER CONTROL MIXERS

All of the application sliders associated with either of these two controller mixers should be off - sliders set to the bottom of their travel.

B. SOURCES

1. OSCILLATOR #1

Oscillator 1 shall be used as the pitch source for tuning the sequencer. Select either the Square or Sawtooth waveform with the waveform SELECT/OFF switch and raise Oscillator 1's volume slider.

2. OSCILLATOR #2

OFF

PART II - SCALING AND FINE TUNING THE EML 400 SEQUENCER

A. QUANTIZER Part 1

Set the COARSE slider so it corresponds to 12. 12 represents 12 tones/octave, the semitone scale. The various scales set by the COARSE control span 12 tones/octave up to 60 tones/octave.

Temporarily place the FINE control slider in the middle of its travel. Fine tuning the sequencer to a reference is realized utilizing the FINE slide control - the procedure for this is detailed in QUANTIZER PART 2.

B. SET/OFF/RESET SLIDER SWITCH

1. Move this switch from the RESET position to the SET position. When this switch is in the RESET position, LED #1 should be on. (The vertical column of QUANTIZER LED'S just left of the CONTROLLERS section.) Switching to SET, an LED numbered 1-13, or the REST LED (the green LED) will appear. This is completely dependent on the position of the slider in Control Voltage Row #2 of Stage #1. In addition, an Octave light will light, depending on which position Stage 1's Octave Switch is in.

2. The first slide of Control Voltage Row #2 (Stage #1) should be moved all the way to the bottom of its travel until LED #1 lights. The Octave switch associated with Stage 1 positioned to -1. The corresponding LED will appear.

C. QUANTIZER Part 2

1. Using the TUNE slider in the QUANTIZER section tune the sequencer to the pitch (frequency) of your reference (or as you desire). Adjust the TUNE slider until they no longer "beat".

2. Increase the pitch of the reference source by two octaves (or triple frequency).

Now shift the Octave switch associated with Stage 1 to the +1 position. Use the FINE slide control to tune the two pitches until the "beating" ceases.

The Sequencer is now tuned and octavated! It is ready to PROGRAM!

NOTE Diagrams A-1 and A-2

ELECTROCOMP®
SEQUENCER

DIAGRAM A-1

'READYING THE SEQUENCER

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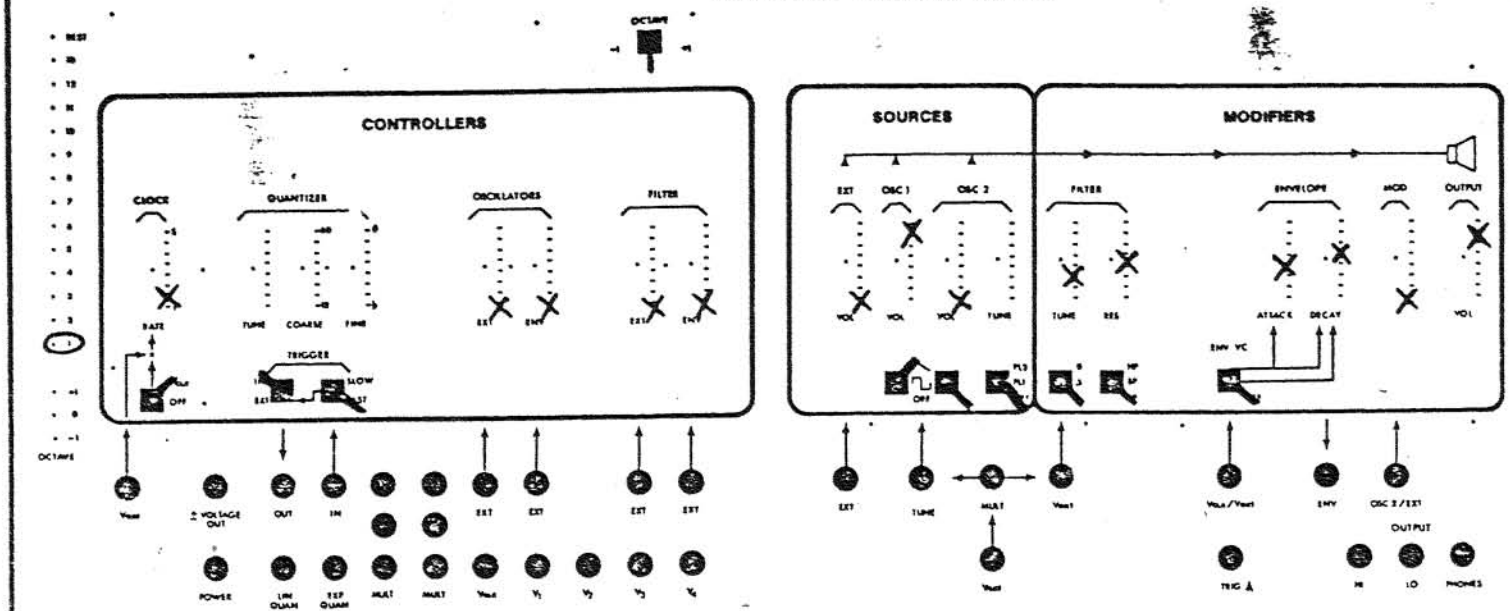

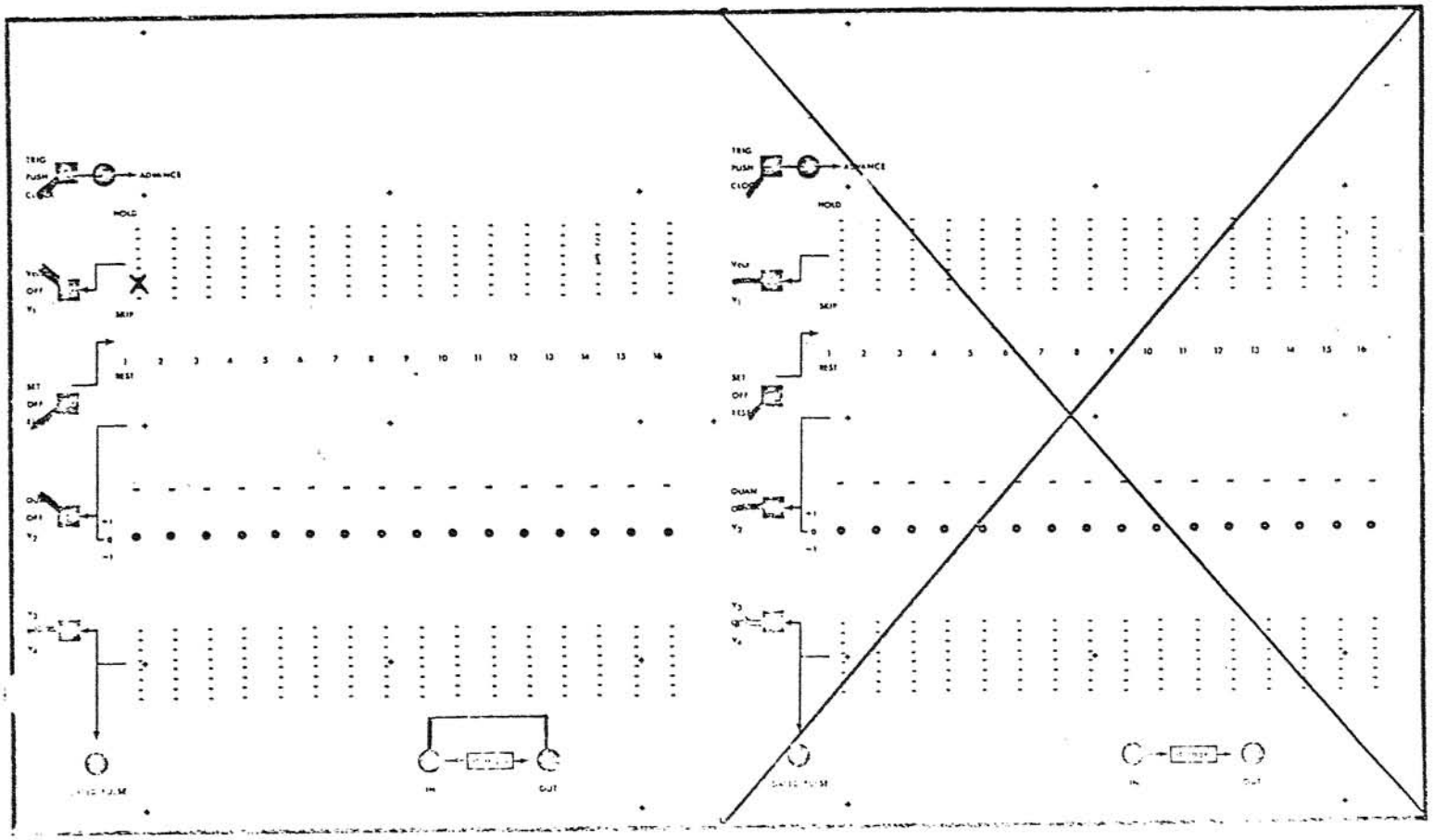

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DIAGRAM A-2
SCALING & FINE TUNING THE SEQUENCER

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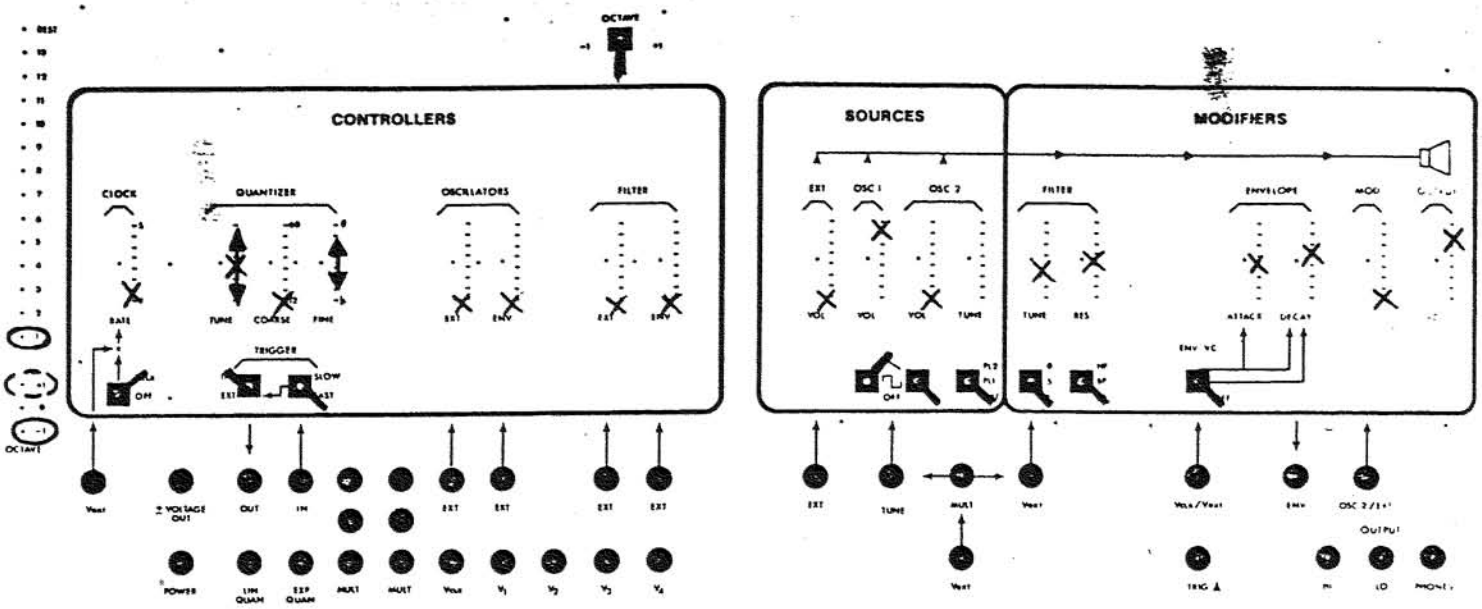

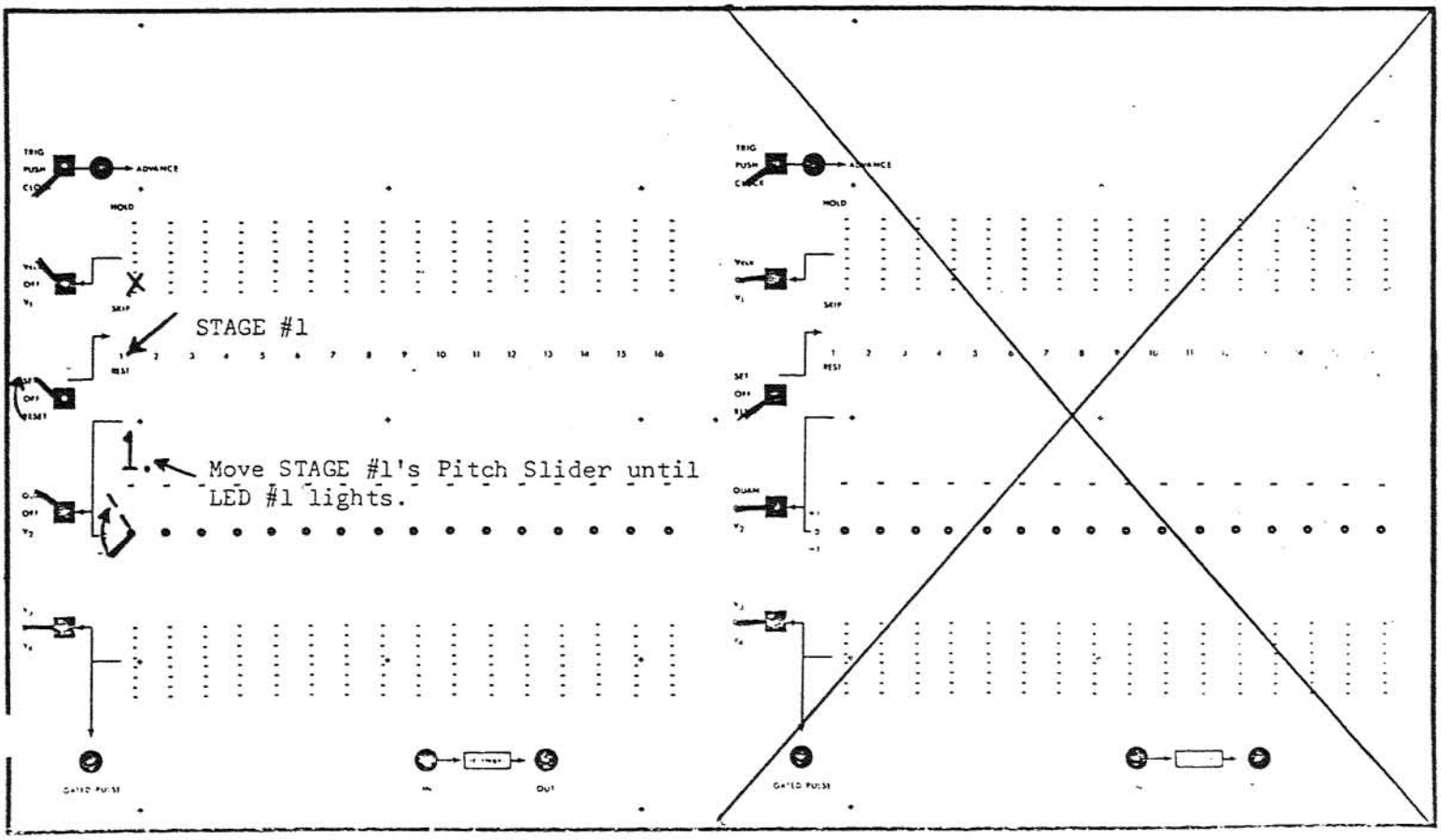

PROGRAMMING THE EML 400 SEQUENCER

The "PROGRAMMING" procedure consists of two steps, they are as follows:

1) "Program Readying" the Sequencer.

2) "Programming the Sequencer", followed by the actual running of the Sequencer.

PART I READYING THE EML 400 SEQUENCER

Program Readying the EML 400 Sequencer for a PROGRAM consists of Parts 1 and 2 of the section Scaling and Fine Tuning the EML 400 Sequencer. For details reread the aforementioned section and carefully note diagram R1. READYING the EML 400 Sequencer allows the user to "program" the Sequencer without "confusing" it or the user! It is a failsafe procedure.

After setting the desired scale and tuning the Sequencer, the actual programming of the Sequencer may commence.

PART 2 PROGRAMMING THE EML 400 SEQUENCER

Moussorgsky's Promanade Theme from Pictures at an Exhibition will be used as the PROGRAM example.

A. SET/OFF/RESET SLIDE SWITCH

Position to SET

B. ADVANCE SLIDE SWITCH

Set from CLOCK to PUSH. This will activate the TRIGGER and the QUANTIZER sections.

C. PROGRAMMING THE PITCH AND OCTAVE/STAGE OF THE SEQUENCE

1. Position the SET/OFF/RESET Slide Switch to OFF. Move Stage 1's pitch slider until LED #8 lights. Set the Octave switch for Stage #1 in the zero position. The zero Octave LED will light.

2. Depress the pushbutton associated with the Advance Slide Switch once or until the light indicating Stage #2 is on. Move Stage #2's pitch slider until LED #6 lights. Set the Octave switch to zero.

NOTE: If the pushbutton is held, the Sequencer continues to advance until the button is released. If you are advancing the Sequencer via the pushbutton and you inadvertantly go past the stage you wished, simply move the SET/OFF/RESET slide switch to RESET then SET, and finally to OFF. This will bring you back to Stage #1 and you will be ready to advance with the pushbutton.

3. Advance the Sequencer to Stage #3. Position the pitch slider until LED#11 lights; set the Octave switch to zero.

4. Continue the process through Stage 16 according to the LED numbers and positions of the octave slide switches marked in diagram P-2.

Because the theme is 13 events long, the remaining 3 stages have been set to REST - no pitch is programmed or sounds.

5. It is good practice to go through the sequence again just to double check and make sure all the pitches and octave settings are correct.

D. SETTING THE DURATIONS OF EACH PITCH/STAGE IN THE SEQUENCE

- PROGRAMMING THE RHYTHMN -

1. Diagram P-3 indicates the 13 slider positions for the timing-rhythmn of the sequence. It is not necessary to pushbutton advance the Sequencer to set the duration for each respective stage. The duration slide controls for stages 14-16 can be, at your descretion, set to SKIP (moving the slider to the bottom of its travel) or set to any time increment up to HOLD (at HOLD the sequence will not advance until the slider is dropped to a definite time value).

E. DEFINING OVERALL CHARACTERISTICS OF THE SEQUENCE

1. The tempo of the sequence is controlled by the CLOCK slider control Vclk OFF Switch. Set the CLOCK slider next to the third hash mark.

2. SOURCES: Oscillator 2 may be turned on to add another voice; a waveform selected, tuned, and its volume slider raised. The option is open to tune Oscillator 2 to unison or various intervals in relation to Oscillator 1 giving an effective chordal effect.

3. Octave transposition of the oscillators and filter is achieved with the OCTAVE switch above the CONTROLLER section. This switch determines the overall range.

4. FILTER: The quality of the sound is defined by the Filter. Experiment freely with the TUNE and RESonance sliders, Filter Select (HP, BP, LP) and the Filter tracking (0, .5, 1) switches to determine the timbral setting you wish.

5. ENVELOPE: The envelope controls the loudness pattern/pitch/stage. When the envelope is in the OFF position, the ATTACK and DECAY sliders determine the time for their respective functions. Moving the switch to either the Voltage Control of Envelope Decay or Voltage Control of Envelope Attack and Decay, means that the envelope no longer defines a time unit for ATTACK and DECAY, but rather the voltage controlled function now "reads time" or "reads voltage". The ATTACK and DECAY sliders now determine proportion. Experiment

with the VOLTAGE CONTROLLED ENVELOPE. It's a unique and vitalizing new synthesizer function/feature.

6. MODULATOR: Ring or Amplitude Modulation can be added to the signal(s) out of the filter.

F. RUNNING THE SEQUENCER

1. SET/OFF/RESET SLIDE SWITCH

Position in RESET

2. THE ADVANCE SLIDE SWITCH

TRIG/PUSH/CLOCK switch should be set to CLOCK.

3. To "run" the sequence simply move the SET/OFF/RESET slide switch to SET and then to OFF.

4. To have the Sequencer repeat be sure there's a patch cord between the IN and OUT jacks near the bottom of the PROGRAM panel.

G. DIAGRAM P-5

Patch 5 diagrams some special effects that can be achieved with the EML 400 Sequencer and the EML 401 module.

For example, V_3 or V_4 can be used to change the timbre of each stage; or voltage control the envelope to vary the attack and/or decay; or V_3 or V_4 can be used as a modulating signal and vary the dynamics of the piece. Many uses are possible.

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DIAGRAM R-1

READYING the EML 400
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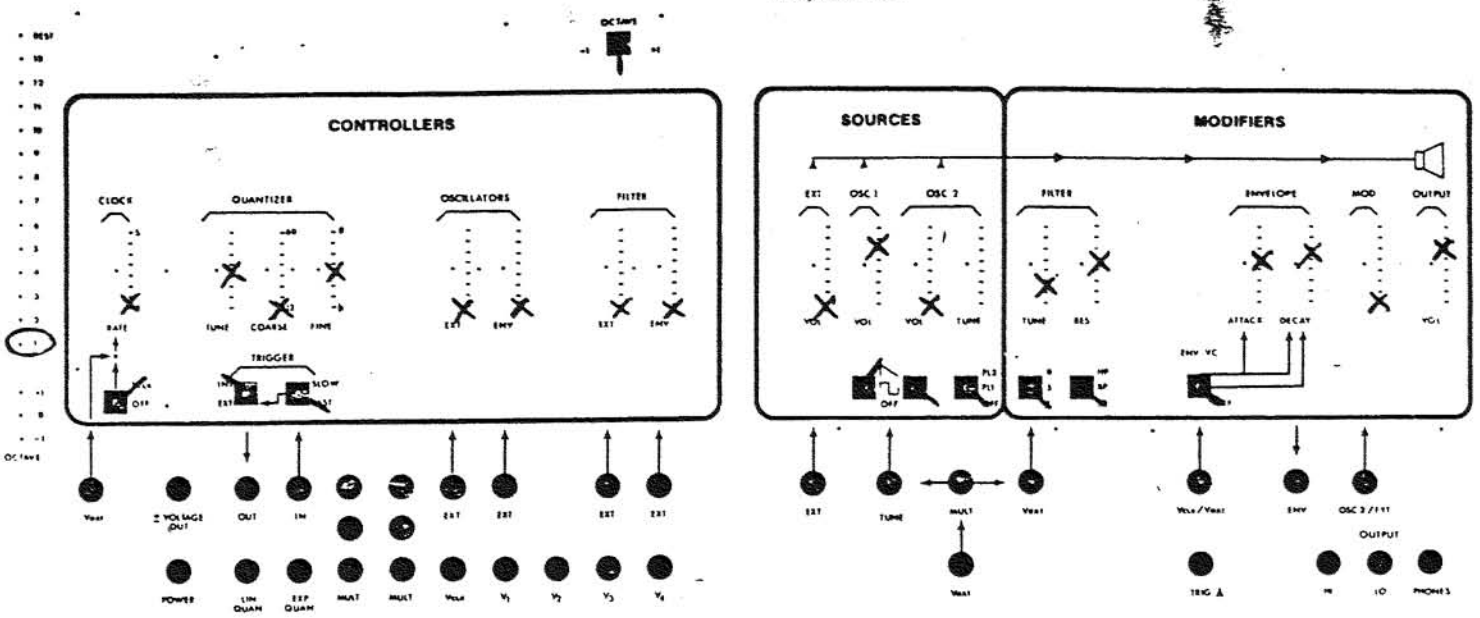

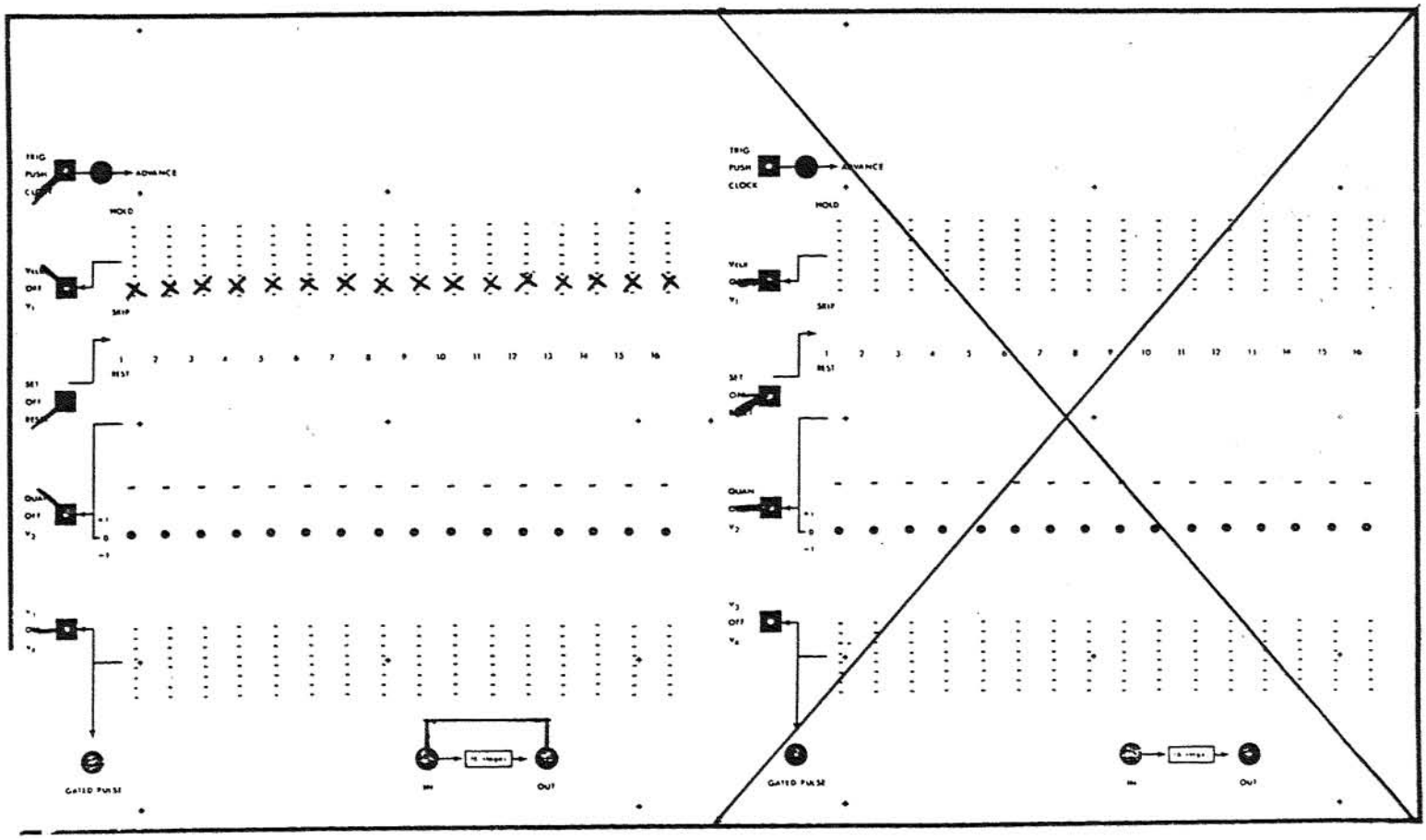

ELECTROCOMP®

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ELECTRONIC MUSIC LABS., INC. VERNON, CONN. 06066

DIAGRAM P-1

PROGRAMMING THE EML 400

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